JSC takes baby steps towards moon and Mars

by Kendra Phipps

Someday soon, NASA's next-generation spacecraft will thunder off the launch pad, taking the United States back to the moon and setting off an exhilarating new era of exploration.

But first, we have to put an astronaut in a tube.

That's the nickname for an experiment that will pinpoint the ideal size for a hatch, and it's just one of the many baby steps on the road to that exciting launch day. Read about it, and another first step, below.

ASTRONAUT IN A TUBE

The "tube" in question is actually the Low Impact Docking System (LIDS), which will be a docking interface on the Crew Exploration Vehicle (CEV). In designing the LIDS, a key question needs to be answered: what size does the hatch need to be to let a suited astronaut fit through it?

"We need to answer the basic questions first, then go into the details," said John Park. Park is the manager of the Architecture, Habitation and Integration Team within the Crew and Thermal Systems Division.

A test was devised using a partial gravity counterbalance system (PGCS), which simulates reduced gravity. The PGCS in Building 29 held a low-fidelity LIDS mockup while a suited astronaut attempted to "float" through it.

"We actually suspended the mockup, and the astronaut stood there and simulated floating through it by pulling it down," said Park. The team tested a variety of diameters to narrow the hatch parameters, and also to see which current spacesuits could be adapted for use on the CEV. The next step will be to repeat this test with a more realistic LIDS mockup.

Suited astronauts also tried to move through different hatches in the CEV mockup in Building 9, Park said.

"We found some good results and took some video analysis," he said. "It was good for getting a ballpark figure."

Park is quick to point out that this test is a team effort. It involves people from the Extravehicular Activity (EVA) Office, the Constellation Program and the Space Life Sciences and Engineering Directorates, to name a few.

"Our job is to integrate all that together and conduct the test with their assistance," said Park. "It's a challenging job, but something we really enjoy."

WALKBACK TEST

In search of some fantastic moon rocks, an explorer on the moon takes the lunar rover out for a spin. She's gone a few kilometers away from the base when the rover crawls to a stop. Uh-oh.

In that scenario, would the astronaut be able to walk back to safety, or would her spacesuit be too cumbersome for the journey?

Enter the "walkback" test. This experiment aims to determine whether an astronaut could walk long distances if necessary, and to refine suit designs to make such a walk easier. The data could also be used in the design of portable life support systems.

The test is spread out over several weeks and uses Building 9's PGCS, which is nicknamed "POGO." Several test subjects take turns walking while strapped in the POGO, which is rigged to simulate reduced gravity. While they're walking, the subjects are monitored closely—their heart rates, temperatures and carbon dioxide outputs are recorded, and more subjective traits such as discomfort, gait and ease of motion are noted as well.

"The subject is hooked up to a metabolic cart, and the advanced biometrics facility is looking at how their movement changes in different gravity levels," said Jessica Vos, test project manager in the Spacesuit Systems Branch. "The lab assesses their cognitive changes, evaluates how hard the exercise is and how much they're compensating."

The first round of the walkback test allows the subjects to walk in everyday clothing. Later, each person will put on a spacesuit—specifically, the Mark III Advanced Space Suit Technology Demonstrator suit—and try walking again, this time for a long duration.

"We're going to have the same crew members get in the suit and try to walk 10 kilometers, picking a gait that's comfortable to them," said Vos. She added that the subjects are not required to complete the full 10 kilometers, but can stop when they need to. Each person will try the long walk three times, each at a different simulated gravity level.

The results will help engineers design suits that will not only stand up to a mission's planned tasks, but also to unexpected events like a very long walk.

But if an astronaut made the long trek back to the base, she would then have a hatch to deal with. Would she be too mentally and physically exhausted to open it at that point?

The questions just keep coming, but one by one, tests like this are helping to answer them. Vos said that the walkback test is a collaborative effort among many JSC teams, including several engineering branches and the EVA Office.

CLOCKWISE FROM LEFT
Jason Norcross records data during the test.

Lesley Lee monitors the speed of the treadmill as Mark Dub is lifted by the POGO apparatus to simulate the moon's gravity.

Mark Dub adjusts his head gear.

Interpreters keep communication lines open for Mission Control

by Donna Lin

ALONG with the flight controllers and directors, another small team works around the clock to ensure that the International Space Station Mission Control Center (MCC) operates smoothly. Both American and Russian team members depend on this group. What group is it?

Give up? It's the interpreters who keep the bilingual communication lines open between the MCC and its counterpart in Moscow.

Alina Spradley is one of the Russian interpreters who help keep operations in the MCC going 24 hours a day, seven days a week. Some of these hardworking people are translators, performing written translations, while others are interpreters, specializing in oral translation.

Spradley said that she always wanted to be a translator, even attending the Monterey Institute of International Studies in Monterey, Calif. to earn her master's degree in formal translating and interpreting.

"I love languages, but I don't really like to write my own words down," Spradley said. "Translating is perfect for me because I can take the words that other people say and make them pretty for another person to understand."

JSC's translators must complete a long path to become qualified MCC Russian translators. New translators are hired by TechTrans International (TTI), a language support and logistics services company, where they begin a rigorous training regimen to learn the technical language that is so prevalent in the spaceflight world. Translators begin by performing written translation tasks, reading training materials and working alongside editors.

Eventually, new translators are given their first assignments and work their way up to more difficult projects and tasks. Spradley said it takes approximately two years for a translator to be considered fully proficient and MCC-certified. Out of the 37 translators working at JSC, 21 are MCC-certified.

Not all translators are native Russian speakers. Some native speakers of English work for TTI, having received formal training in Russian as undergraduate and graduate students. Spradley said that a formal education is helpful but not a necessity when it comes to being a good translator. TTI employs translators and interpreters who come from a wide variety of educational backgrounds, including engineering, technical and biomedical backgrounds.

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From left to right are translators Peter Stavitsky, Alina Spradley, Michael Toubin, Alex Altayev, Lydia Bryans and Olga Dickerson (sitting).

"To be able to translate, you really have to know the language well. But you don't need to have formal training in Russian," she said. "Being a good translator relies on having a natural talent for it, strong interpersonal skills and a good cultural knowledge of others' backgrounds."

MCC-qualified translators can also become certified in two different areas of focus—space-to-ground operations and extravehicular activity (EVA). Space-to-ground operations include translating Russian to English for the MCC, and English to Russian for the control center in Moscow.

When space station crews are scheduled to perform spacewalks, translators are seated next to the CAPCOM in the MCC for the duration of the event.

"I've been seated next to the CAPCOM for the past three EVAs, and I'm there just in case the Russian cosmonaut involved in the EVA doesn't understand the instructions he's being given," Spradley said. "I've never had to step in and translate for a cosmonaut, and I hope that I will never need to, because this means everything is going well."

Although it may seem as if the life of a Russian translator at JSC becomes routine, it is anything but. The translators' schedules are determined by several factors, including training priorities and professional growth opportunities.

Spradley said that keeping translators on different projects helps them to maintain their proficiency with different areas of the MCC. She may be assigned to space-to-ground operations for two weeks, then moved to the MCC to support technical interchange meetings. Most of the interpreters support teleconferences on a regular basis, which normally begin between 6 and 7 a.m. and last approximately two hours. This allows interpreters to spend the rest of their days supporting meetings, crew training and flight operations.

Although translators are usually grouped into regular nighttime and daytime shifts, Spradley said they sometimes have to work irregular hours to address crew members' needs.

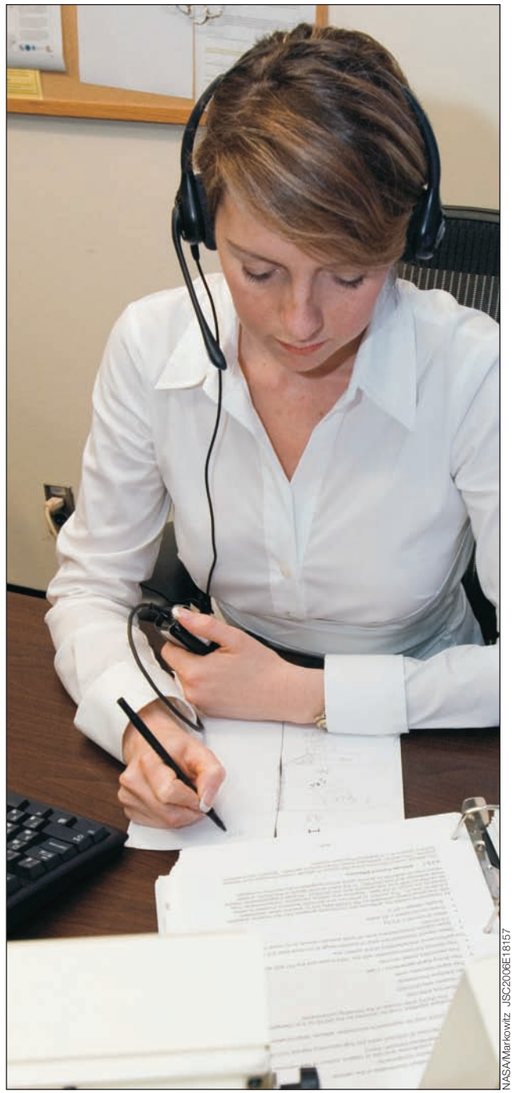
"I once received a call from my manager telling me that I needed to be in the Teague Auditorium to support a Public Affairs Office event with a cosmonaut at 4," she said. "I asked if it was 4 a.m. or 4 p.m. and wasn't even surprised to find out that it was 4 a.m."

When Russian cosmonauts are on site to fulfill training requirements, translators are extremely involved in their classes and are very familiar with the material and literature that astronauts and cosmonauts are given. Spradley said she was so close to one cosmonaut's training experience that the cosmonaut's crew members joked that Spradley was ready to fly with them.

Training as a translator doesn't end with the first few years on the job. Spradley said she is always familiarizing herself with the materials that crew members are given, and constantly researching new terms and tasks with which cosmonauts must become proficient.

Although not everyone enjoys reading material and literature and spending a great deal of time learning while on the job, Spradley said she wouldn't trade her job for any other in the world.

"I have been at JSC for six years now and can't imagine what could be better than the job I have now," Spradley said. "I get to work with all kinds of people, travel to Kennedy Space Center and perform new duties, and I am always doing different things. The work astronauts and engineers perform here is fascinating."



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Alina Spradley is part of the team that helps JSC's Mission Control Center communicate with its counterpart in Moscow.